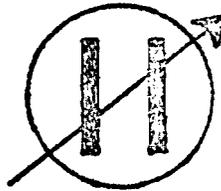


VHF POWER AMPLIFIER
TYPES FM500A, B, C
147 TO 174 MC.

TECHNICAL DESCRIPTION AND OPERATING INSTRUCTIONS



MARKETING & DISTRIBUTION
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CABLE ADDRESS "OUTERCOM"

ManualsPlus.com

SUPPLY VOLTAGE: 117 volts AC, 50/60 cycles

POWER INPUT: Standby - 75 watts

Transmit:
FM-500A - 225 watts
FM-500B - 300 watts
FM-500C - 400 watts

RF POWER OUTPUT: FM-500A - 85 watts ($\pm 10\%$) (120 watts DC Input)
FM-500B - 100 watts ($\pm 10\%$) (180 watts DC Input)
FM-500C - 150 watts ($\pm 10\%$) (250 watts DC Input)

TUBE & SEMI CONDUCTOR
COMPLEMENT: (4) type CER72A high voltage rectifiers
(1) 1N1490 relay rectifier

FM-500A and FM-500B
5894A - RF amplifier
6AQ5 - screen clamp

FM-500C
7854 - RF amplifier
6AQ5 - screen clamp

EMISSION: Same as unit driving it - either narrow
(16/20F3) or wide band (36/40F3)

RF IMPEDANCE: Input and output - 50 ohms

DRIVING POWER: 35 watts, standard unit, may be modified for
15 watts drive requirements

SPURIOUS ATTENUATION: 70 db.

WEIGHT: 25 lbs.

DIMENSIONS: 13" wide, 7" high, 7-3/8" deep

Complete ready to connect to FM50-A (FM50-A must have its own AC cable)
includes RF cable to FM50-A and its own AC power cable.

CONTROLS: Off-Low-High Switch

OFF - FM50-A and FM-500 completely turned off.

LOW - FM50-A feeds antenna directly,
FM-500 tubes are heated ready for instant
use.

HIGH - FM-500 keyed simultaneously with FM50-A.

NOTES: If fuse in FM-500 blows, FM-500 Standby light goes out and FM50-A
feeds antenna directly until condition is corrected. No modifi-
cation to standard FM50-A required.

INTRODUCTION

The FM500 series of radio frequency power amplifiers are designed to increase the transmitter output of the FM50-A Communications Unit when used as a base station. The built-in circuitry is such that the FM500 is controlled by the FM50-A through the latter's push-to-talk circuitry. The FM500 circuitry also permits the FM50-A to feed the antenna directly under certain modes of operation.

The most popular version of the FM500 series is the Type FM500-B which is designed to run at a nominal plate power input of 180 watts input (for most business radio licenses). The FM500-A is identical to the FM500-B except that a resistor in its power supply (R111) limits the plate power input to 120 watts. This is normally required under land transportation usage of the unit.

The FM500-C is similar to the FM500-B except that the output tube is of a different type permitting a maximum plate power input of 250 watts. (In general for Public Safety and Industrial licenses).

INSTALLATION OF THE FM500 SERIES AMPLIFIER

The FM500 radio frequency power amplifier has been designed as a desk top companion to the FM50-A. An AC receptacle on the rear of same is designed to accept the AC cord of the FM50-A thereby permitting intergrated control as well as only requiring one AC outlet for the base station package assembly. A cable with 8 pin male plug as an integral part of the FM500 is designed to plug in to the remote socket of the FM50-A. If remote control of the FM50-A is in use, the cable for same must now be plugged in to the remote socket of the FM500 (J101). The cable terminated in connector P109 on the rear of the FM500 chassis should be connected to the antenna terminal of the FM50-A and the antenna lead in the system should then be connected to J108 on the rear of the FM500 chassis.

The front panel switch of the FM500 has three positions designated "off" "low" and "high". In the "off" position the FM50-A as well as the FM500 is completely de-energized. If this feature is not wanted then the power cable from the FM50-A should be plugged in to the AC outlet of the building instead of the rear chassis of the FM500. In the "low" position the tubes in the FM500 are warmed up, however, the unit is basically inoperable and the FM50-A feeds the antenna directly when keyed. In the "high" position the keying circuitry of the FM500 is tied in directly to the FM50-A and keying of same automatically drives tube V101 in the FM500 producing full or "high" power output. A secondary feature of the circuitry provides for automatic drop back to the FM50-A feeding the antenna if fuse F101 should blow.

TUNING, ADJUSTMENT AND ALIGNMENT OF FM500

The test socket designated J102 on the rear of the FM500 has been designed to accommodate the same test meter recommended in the FM50-A Instruction Book. When so used the following voltages and currents are available:

<u>Test Meter Position</u>	<u>Meter Information</u>
5	PA Grid (full scale equals 20 milliamperes)
6	PA Plate Current (full scale equals 400 milliamperes)
7	PA Plate Voltage (full scale equals 1000 volts)

The FM500 should be removed from the cabinet when changing frequency from that considerably different to which it has been tuned, or if it is suspected that the unit needs service. Before attempting to re-align the final stage, the tune operate switch should be set in the "tune" position which will limit the off resonance plate current of tube V101 to a safe value. With the transmitter keyed, the grid tuning capacitor C103 should be adjusted for maximum grid current as indicated on position 5 of the test meter. Normal current will be in the vicinity of 9 milliamperes. Note: The various tuning adjustments for the RF amplifier circuitry are accessible through the front panel of the unit by removing the nameplate on the right hand side.

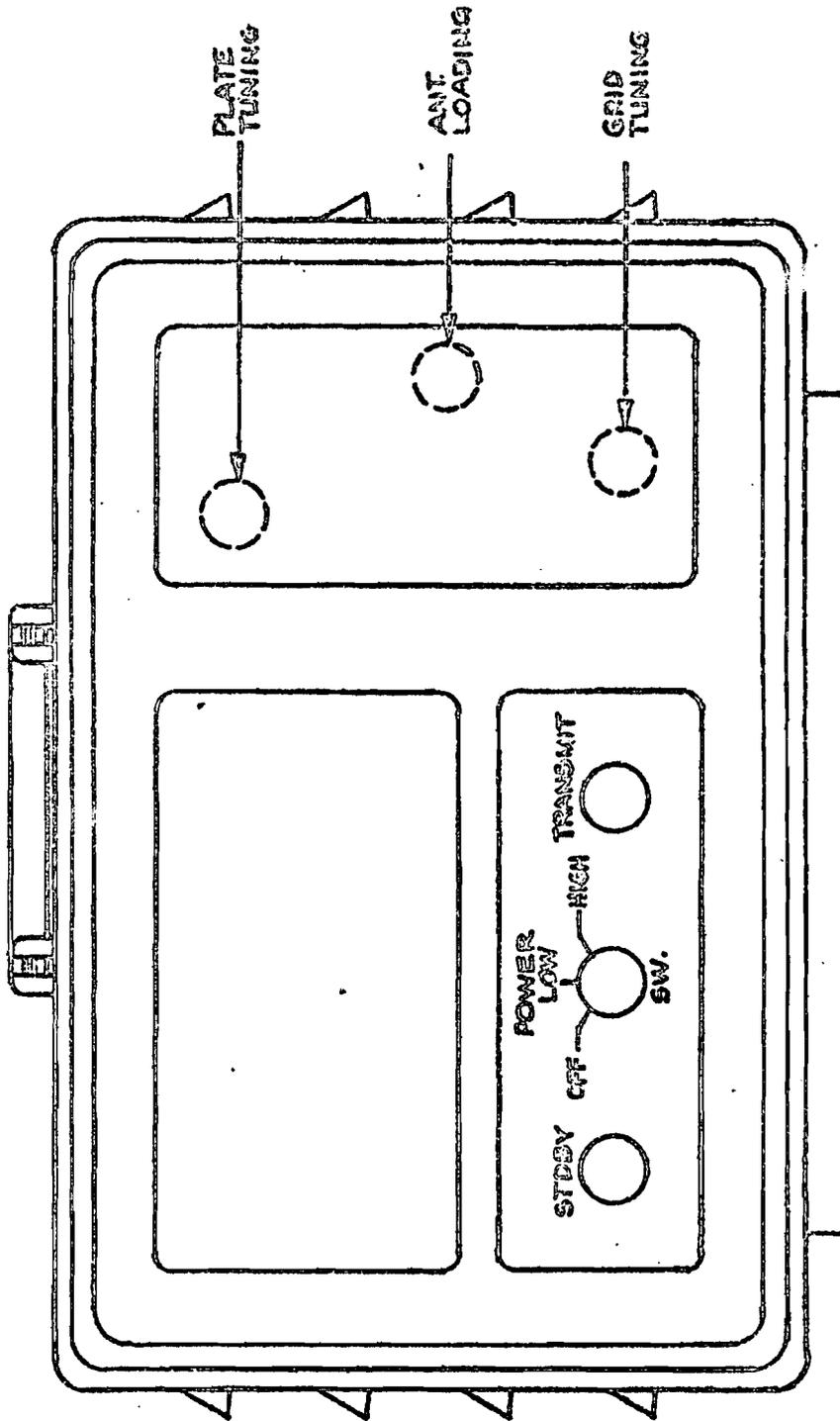
With C106, the antenna loading capacitor set at minimum capacity, the plate tank adjustment Z102 should be adjusted for minimum plate current. The tune operate switch should now be set to the "operate" position and plate tuning checked again. Next, the antenna loading capacitor C106 should be increased in capacity noting that the plate current of the final stage will rise. Do not return plate during this tuning procedure, it is important that the amplifier be connected to a dummy load or to an antenna. Using this tuning technique this amplifier should be loaded to a value in accordance with the following chart.

Type FM500-A Amplifier	200 milliamperes (600V DC)
Type FM500-B Amplifier	225 milliamperes (800V DC)
Type FM500-C Amplifier	250 milliamperes (1000V DC)

Under most service conditions where the amplifier is operating normally and may only need alignment checks, the adjustments of the grid tuning capacitor C103, the output circuit Z102 and the antenna loading capacitor C106 may be made from the front panel without removing the unit from its cabinet.

The FM500 amplifier increases the output of the FM50-A unit in amplitude, that is, the radio frequency power output is increased as indicated in the performance specifications of the manual. The amplifier does not affect the modulation deviation or the modulation limiter sensitivity and it should not be necessary to re-adjust same when adding the FM500 unit to the FM50-A. In the "standby" position the antenna always feeds the FM50-A and there should be no difference in performance of the receiver section of the FM50-A whether the amplifier is connected or not. The FM50-A is tuned for maximum RF output (within recommended limits of plate current), as its excess power is dissipated in Z101 when driving the grid circuitry of V101. Tube V102 is a "clamp" to reduce the voltage applied to the screen of V101, in the event of lack of drive thereby limiting its plate current to a safe value.

FM 500 A, B, C



NOTE : REMOVE NAMEPLATE TO ADJUST CONTROLS.

FM 500BPARTS LIST

<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>HAMMARLUND PART NO.</u>
	<u>CAPACITORS</u>	
C101, 102	Disc. Ceramic .001 MFD GMV, 500V	M23034-30
C103	Variable 2.4-10.8 MMF	K34604-G4
C104	Disc. Ceramic .001 MFD GMV, 500V	M23034-30
C105	Disc. Ceramic .001 MFD GMV, 3000V	M23034-32
C106	Variable 2.3-15 MMF	K34451-G1
C107	Electrolytic 200 MFD NPDC, 25V	K23925-1
C108	Silver Mica 250 MMF \pm 10%, 350V	K23928-1
C109,110,111,112	Electrolytic 100MFD, 450V	K15504-47
C113	Disc. Ceramic .01 MFD GMV, 1000V	M23034-8
CR101	Diode, Silicon (1N1490)	K41212-1
102,103,104,105	Rectifier, Silicon	M41215-3
F101	Fuse, 6 amps 250V	K15928-11
I101	Neon pilot light, Amber	K40922-4
I102	Neon pilot light, Red	K40922-3
J101	Socket (8 Pin) (Remote)	K16083-1
J102	Socket (11 Pin) (Test)	K15944-17
J103	Receptacle, A.C. Power Outlet	K35013-1
J104	Connector, Receptacle (Antenna)	K16111-1
J105,106,107,108	Receptacle (Included in K102)	-----

<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>HAMMARLUND PART NO.</u>
K101	Relay, 3PDT, 5 Amps	K40404-2
K102	Relay, Coaxial Transfer Switch	M40413-1
L101	Coil	K53226-1
L102	Coil	K53187-1
L103,104	Choke, RF	K26640-1
L105	Coil	K53227-1
RESISTORS		
R101	Fixed 10 Ohms \pm 5%, $\frac{1}{2}$ W.	K19309-246
R102	Fixed 15K \pm 10%, 2W.	K19304-46
R103	Fixed 470K \pm 10%, $\frac{1}{2}$ W.	K19309-113
R104	Fixed 100 Ohms \pm 20%, 2W.	K19304-321
R105	Fixed 40K \pm 10%, 20W.	K19432-38
R106	Fixed $\frac{1}{2}$ Ohm \pm 1%, $\frac{1}{2}$ W.	K19443-2
R107,108,109,110	Fixed 47K \pm 10%, 1W.	K19310-89
S101	Switch, Toggle (Off-Low-High) (DP-3 POS)	K26675-1
S102	Switch, Slide, SPDT	K52015-1
T101	Transformer, Filament	M40048-1
T102	Transformer, Power	P53138-1

<u>SCHEMATIC DESIGNATION</u>	<u>DESCRIPTION</u>	<u>HAMMARLUND PART NO.</u>
V101	Tube, Electron 5894 (Not to be assembled until final test).	K40910-1
V102	Tube, Electron 6AQ5	K16387-1
Z101	RF Pad Assembly	M53220-1
Z102	Plate Tuning Assembly	P11736-G51

MISCELLANEOUS ITEMS

Instruction Manual	41386
Socket (7 Pin, 5894)	K41016-1

FM 500A PARTS LIST

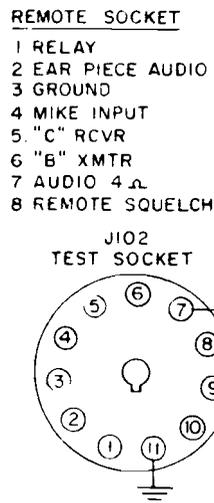
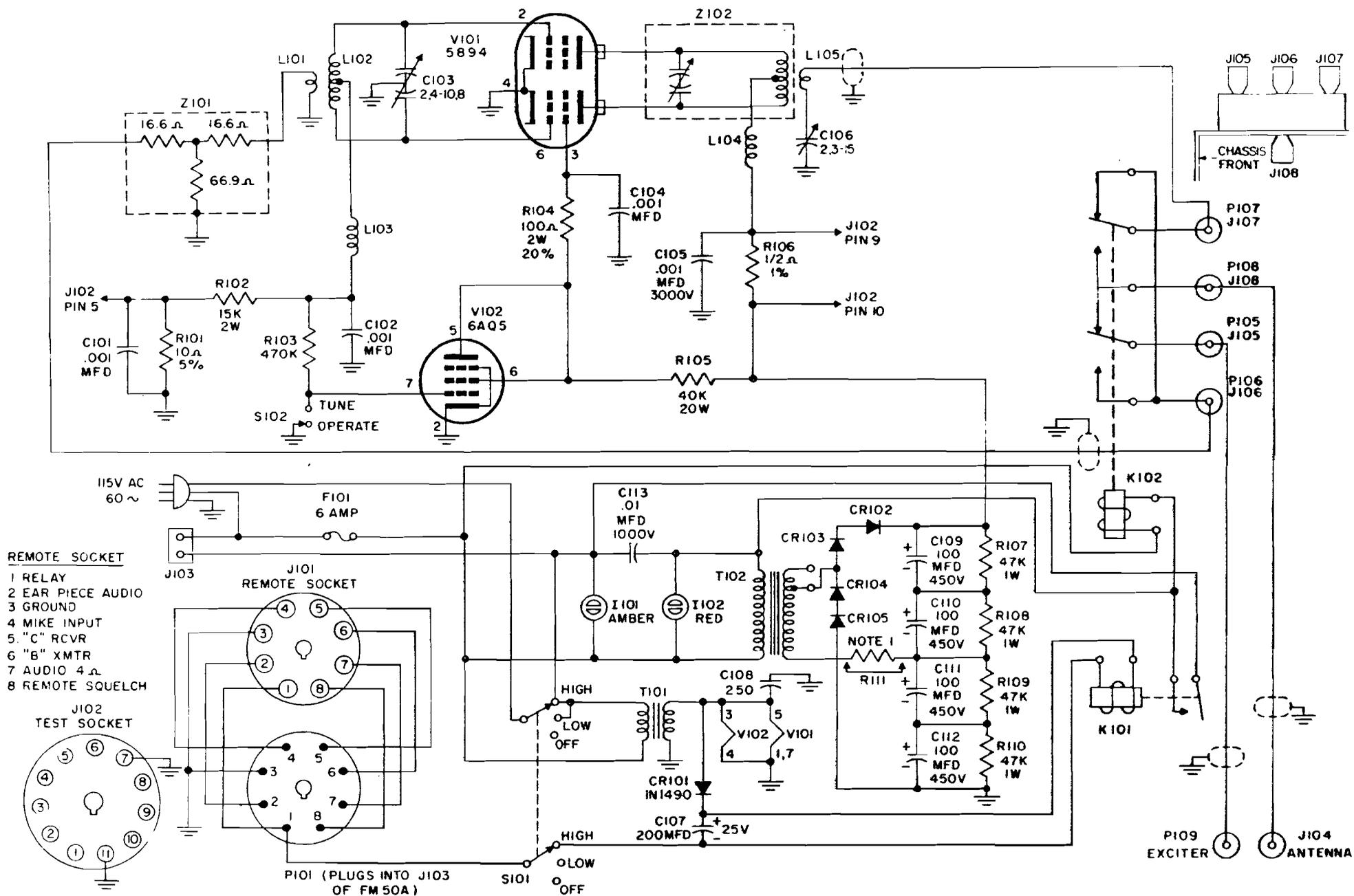
The Parts List for FM500A is exactly the same as the FM500B with the addition of the following:

R111 Resistor fixed, 65 Ohms \pm 10% 50W.	K19340-5
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FM 500C PARTS LIST

The Parts List for FM500C is exactly the same as the FM500B with the following exceptions:

V101 will be tube type 7854 (instead of 5894)	K40900
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NOTES

1. THIS COMPONENT USED ON FM-500A ONLY (65 OHM-25 WATT)
2. ALL CAPACITORS ARE IN MICRO-MICROFARADS UNLESS OTHERWISE SPECIFIED
3. ALL RESISTORS ARE 1/2 W. ±10% UNLESS OTHERWISE SPECIFIED